Hobbies WEEKLY

CONTENTS

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A NOVEL ELECTRIC

AEROPLANE GAME

ONE of the many fascinating things to be seen on some of our big airports are those little signposts that point the direction, not to our own towns and villages, but to Paris, New York, and so on. Something of the same thrill of far-away places is experienced with this electric aeroplane game. As the planes circle the tower, the destination plates light up consecutively, each player holding a ticket bearing one of the place names.

Slowly the planes come to a stop. The light flickers tantalisingly over the panels and finally comes to rest on one of the place names, and the holder of that ticket has to be 'paid for' by the other players.

Straightforward Construction

The construction is quite straightforward and provides an interesting piece of wood and metal work—the requirements in the matter of wood being quite small. Plywood, if available, is best, but anything similar may be used. The planes are spun round by a handle and a string belt, and the lighting is from six flashbulbs and a torch battery housed in the tower.

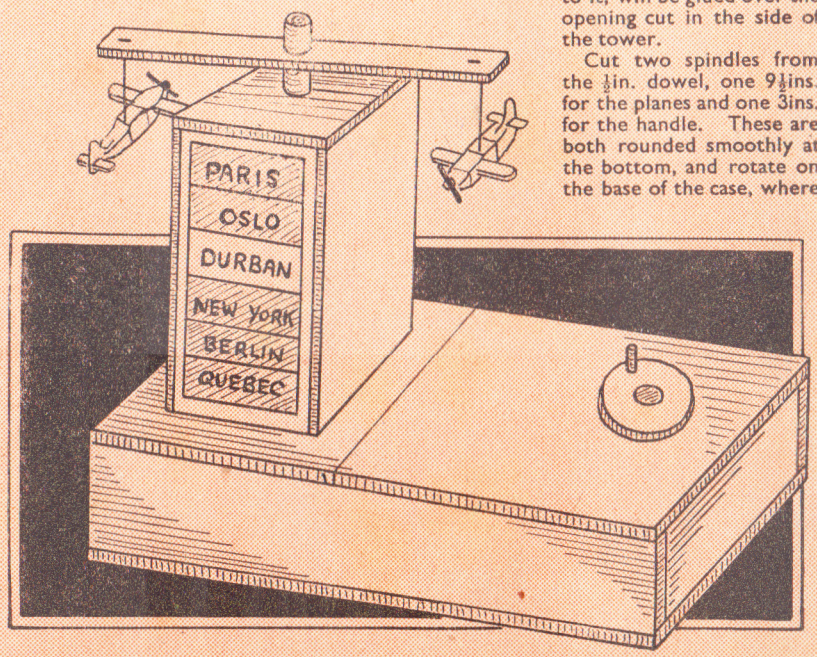
The lighting is on a rotational system, so each bulb lights up in turn as the spindles revolve. The dimensions given allow of wood of ½in. thickness being used throughout, with two spindles of ¼in. dowel. These measurements, however, can be varied as required, to permit the use of any wood the handyman may have to spare.

It will be seen from Figs. 1 and 2 that the body of the model consists of an oblong box 12ins. long, 7ins. wide and 2½ins. deep, and a tower 5¾ins. high, 4½ins. wide and 3½ins. deep. The base can be cut in one piece, 12ins. by 7ins., but it will be found simpler to assemble the 'works', if the top of this base portion is in two halves, one 5ins. by 7ins. (on which the tower stands) and the other 7ins. by 7ins., which carries the rotating handle parts. Cut out and fit all the various pieces before assembling any of them. Then we can start and work from the base upwards, putting in the electrical work and the belt drive as the work progresses upwards.

The Tower

One side of the tower is fretted with an opening 5ins. by 2ins. Behind this is fitted a lamp board (Fig. 2), on which are screwed five pieces each 3ins. by 1in., to divide the board into six sections. A flashbulb is screwed on each section, and a sheet of Perspex or similar transparent material, with six place-names painted on to it, will be glued over the opening cut in the side of the tower.

Cut two spindles from the ¼in. dowel, one 9½ins. for the planes and one 3ins. for the handle. These are both rounded smoothly at the bottom, and rotate on the base of the case, where



a small indentation with centre punch helps to give them a good bed. Holes are bored in the top of the base and in the top of the tower, to take these spindles.

For the plane spindle the hole is 2¾ins. from the end of the case, and it is in the centre of the piece forming the top of the tower. The hole for the handle is 2ins. from the other end of the base—in each case measuring to the centre of the hole. To hold the handle steady a small piece about 2½ins. long, with a ½in hole bored 1¾ins. from one

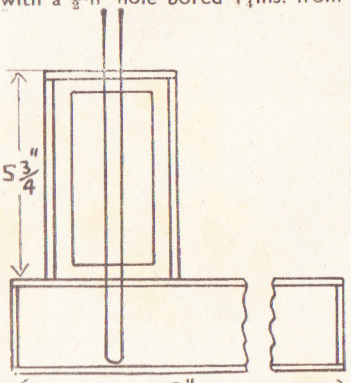


Fig. 1—Front section of box

cut two discs of tin, one 2ins. diameter and the other 3ins. Mark the smaller into six equal sections (Fig. 4) and bore two holes for screws in each, as shown. Then cut out the six segments and flatten them well so that they lay neatly together. The other metal disc is bored centrally with a ½in. hole, and is held with two small nuts and bolts to a wooden disc of the same diameter, similarly bored for the spindle.

Mark the base where the main spindle is to stand, then screw down the six

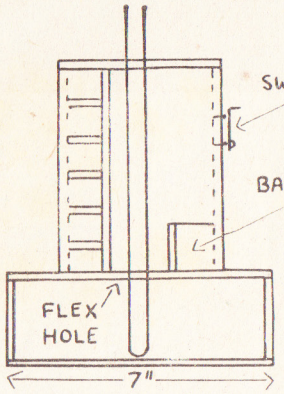


Fig. 2—Side section

sometimes tends to bend after a time, and break the contact.

When the little brush has been fitted to the underneath side of the 3in. disc, put the disc on the spindle, near the bottom, in such a position that the brush just sweeps over the segment plate. This gives us the position for the second brush—a piece of metal strip 1½ins. long, bent to a rightangle at each end. The bottom end is bored for a screw, by which it is held to the base, and the top end is turned over again to form the tip of the brush, which has to rub gently but continuously on the 3in. disc.

Mark the position for the disc on the spindle, and also the place for the pulley wheel, which comes above it. Mark also the position for the little wooden washer which goes just under the top board of the base section. Then pull out the spindle from its temporary stay and glue these three pieces on to it in their respective positions.

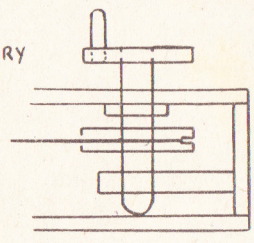


Fig. 3—Section of winding gear

We can now start some of the wiring up. Cut six lengths of covered wire, each about 10ins. long (they

end, is screwed to the inside of the case, as shown at Fig. 3.

Mark out on the base just where the tower will stand, then place a battery into position and mark round it. Cut three little strips (their exact size is immaterial), that can be glued on later, to form a little pocket for the battery, as shown at Fig. 2. For the handle we need, in addition to the spindle and the stay, a circular disc 2ins. in diameter bored centrally with a ½in. hole, and a 1in. oddment of thinner dowelling, for which the disc is also bored, near the edge.

Two pulley wheels are required, each 2ins. in diameter. These are best made up, each from three discs of thin wood or a sandwich of wood and cardboard with the centre piece ½in. less in diameter. When the glue is thoroughly dry, bore them also with the ½in. bit.

The Planes

For the plane bracket cut a strip 8ins. long and about 1½ins. wide, and bore it centrally to take the main spindle. Three discs of wood are required altogether, each bored with a ½in. hole, and one of them goes on the main spindle just under this bracket. The two little planes can either be plastic ones bought from any toy shop, or made up in wood if preferred, in any particular style that the handyman prefers.

They should be identical in size, and about 3ins. long with a 2in. wing span. When we come to finish off the model they are fixed to the plane bracket with wires, which should be stiff enough to prevent the planes from swinging about as they revolve.

The Lighting

We come now to the lighting. First

segments in a circle round this point, with a little space between each segment. Make sure that the spindle will have a good bed in which to revolve, by tapping the centre of these segments with a centre punch.

To get the remainder of the electrical work in, we need the main spindle to be temporarily in position. The simplest way is to cut a temporary stay, bore it with a ½in. hole, and tack it temporarily across the case in such a position that the spindle is held in place. This need not be more than 1in. wide (it will be seen at Fig. 5) and then there is plenty of room to get round it to fit the rest of the pieces.

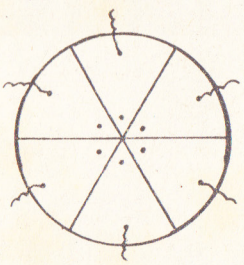


Fig. 4—Tin discs

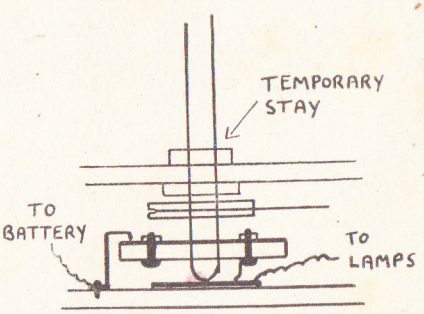


Fig. 5—Wiring connections

can be cut to exact length later) and fix one under the outside screw holding each tin segment. Fix another piece about the same length to the screw which holds the brush on the revolving contact plate.

Fig. 6 shows how the lamps are wired in. Only one is shown for clarity but the others are, of course, treated the same. The wiring is also shown for clearness on the front of the board, but actually it is easier to bore two small holes behind each lamp and run the wiring down the back, where it is clear of the partitions.

One terminal of each lamp holder is joined to a master wire which runs to a

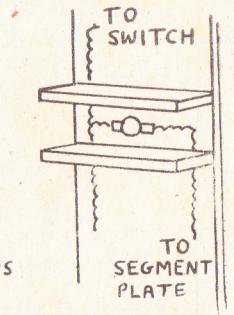


Fig. 6—The lamps

First the 3in. plate. Note that one of the bolts holding the tin to the wood also holds a little piece of metal strip which brushes over the segment plate as the disc goes round. This little piece (and a similar one that takes off the current by brushing on the 3in. metal disc), are best cut from thin springy brass, if available—the kind of material that is used for the brushes of electric motors. Tin can be used, and works quite well, but not being so resilient, it

little switch on the outside of the tower (Fig. 2) and then to the battery. The other six terminals then each take one of the wires from the segment plate—these wires passing through a hole in the top of the base, as shown. The one wire, connected to the brush also uses the same hole and will be joined to the other battery terminal.

The Handle

Having prepared the pieces for the handle, mark the exact position for the

pulley, parallel to the one on the main spindle, and glue this on. Mark and glue on also the little washer that comes immediately under the top piece of the base. Do not glue on the top of the handle until assembly has been completed.

Assembly

It is a good plan to assemble the main structure with screws and not glue. Then if after some time the battery needs renewing or the belt tightening, the inside of the model can be easily got at.

Screw the sides of the base to the bottom piece. Stand the two spindles in place and make a belt of string. Put the belt on the main spindle pulley, then put on that section of the base which comes under the tower, threading the six flex wires and the odd one through their hole, ready for connection to the battery and the lamps in the tower.

We can then screw the handle-spindle bracket to the side of the case, thread the spindle through the other half of the top base-board, and then, with the belt on, screw down this second half of the board. The spindle should turn freely together, when either is rotated, and a little coaxing at their points of contact is well worth while here, to ensure a good job.

Put together three sides and the top of the case, and connect the six wires to the lamp board. Then screw the board in place inside the tower, and glue these three sides of the tower to the base. Glue in also the three pieces for the battery holder and when dry, put the battery in position. Make the little switch for the fourth side of the tower (it need only be two screws as terminals with a movable piece of metal strip between) and connect up the wires.

CUTTING LIST
(for wood ¼" thick)

No. of pieces	Description	Size
1	Base bottom	12" × 7"
1	Base top, part	5" × 7"
1	Base top, part	7" × 7"
2	Base sides	12" × 2½"
2	Base sides	6½" × 2½"
2	Tower sides	5⅞" × 3"
2	Tower sides	5⅞" × 4½"
1	Tower top	4½" × 3½"
1	Plane bracket	8" × 1½"
1	Main spindle	9½" of ½" diameter
1	Handle spindle	3" of ½" diameter
1	Lamp board	5½ × 3"
5	Lamp divisions	3" × 1"
1	Contact plate (also similar piece in tin)	3" diameter
1	Handle spindle bracket	2½" × 2"
1	Handle top	2" diameter
1	Handle top	1" of ¼" dowel
2	Pulley wheels, three section	2" diameter
3	Washers	1½" diameter
1	Segment plate (in tin)	2" diameter

Before putting the fourth side into place try the lighting to see that all is correct. The wiring should run:—master wire from lamp to switch; switch to battery terminal. From the other battery terminal to contact maker on plate, and from each segment of the other plate, back to the six lamps.

Finishing Off

Glue on the plane bracket to the main spindle, with a little wooden washer beneath it to make a strong job. Then fix the two little planes on with wire. Cut a piece of Perspex or similar material 5⅛ins. by 2⅛ins., paint on to it six suitable place names, and then glue it into position. Oddments of the same material can be used to make six 'tickets' each painted with one of the place names. Then finish off the model with gaily-coloured paint or stain.

When playing, the handle should be turned for a suitable time and then spun and released by the hand, so that the model comes to rest entirely of its own accord and the lucky winner is left to chance.

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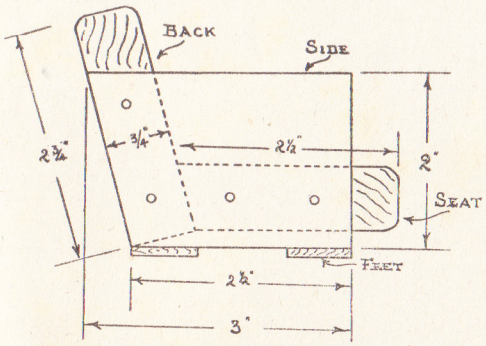
A Miniature Arm Chair

A MODEL arm chair covered in real tapestry, leatherette or similar material, will give great pleasure to any little girl, and can easily be made from a few pieces of wood, some nails and suitable material for covering.

The framework of the model is made from solid wood ¾in. thick and 2ins. wide, on to which is glued and tacked the covering.

From a strip of wood ¾in. by 2ins., cut the back piece 2¾ins. long, two side pieces each 3ins. long at the top and 2½ins. at the bottom, and the seat 2½ins. long. Round off the top edge of the back and the top edge of each side, using a plane and file. Round off the front edge of the seat and chamfer the rear edge, so that the top remains 2½ins. long but the bottom is reduced to 2¼ins.



Side section showing sizes of parts

In each side bore holes as shown to take nails 1in. long. Put chair together temporarily by first fixing the back to the sides, and then fixing the seat between the sides, leaving a space 1/16in. wide at rear of the seat between it and the back. Glass paper all edges, then take chair to pieces.

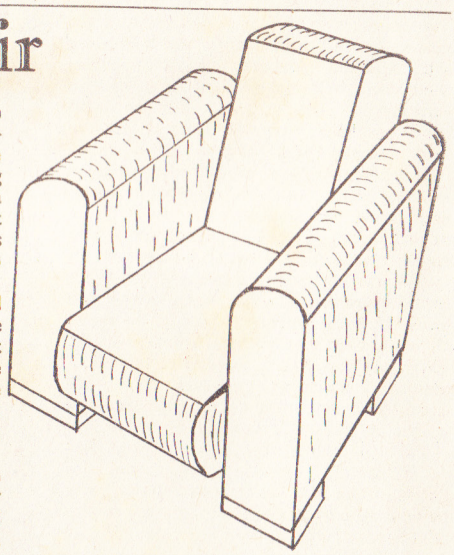
Having decided on the material to cover the model, cut pieces to the required size and stick to the front and back of the arms, the sides of the seat and the sides of the back. Leave till glue is thoroughly set and dry, then trim off. Next cut a length of material to cover the seat.

Tack this to the back of the seat on the chamfered edge and bring it over the seat, gluing to the top, front and underside, and finish off with a tack or two on the chamfered edges at the bottom.

Continue in the same way with the back of the chair, tacking underneath and behind where the seat is fixed.

Each side must now be covered, but before doing so, replace the nails with ones 1¼ins. long. Start by fixing material over these protruding nails and continue gluing material to the wood, finally making fast with a few tacks along the bottom of each side.

When all the parts are thoroughly dry they are assembled. A little glue can be added where the seat and back join the sides, and if a block of hard wood is placed over the heads, this will allow the model to be hammered together without these nails protruding through the covering.



Four small feet are now required, one at each corner. These are made from pieces of plywood ¾in. square and ⅛in. thick, and are tacked to the bottom of the chair. Before fixing, stain the feet dark brown.

Finish off the chair by gluing a very narrow fancy braid to the joined edges, and make small cushions about 1¾ins. square and stuffed with cotton wool.

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Readers may try their hand at this novelty

'SNOWSTORM' ORNAMENT

THE 'Snowstorm' novelty, generally in the form of a paper weight, originated, it is believed, in Germany, and was a useful desk accessory some years ago. Specimens are still to be picked up occasionally if one is lucky, but one can be made without difficulty and would add a novel ornament to the home. The whole thing consists of a glass bowl, in which is, usually, a model building or view, and when inverted, a snowstorm effect is obtained, very pretty to watch.

The exact substance used years ago seems now to be something of a mystery, but experiments in various things resulted in the choice of Christmas 'frost' being considered the best of the lot, and that substance, which can generally be bought at toy and fancy shops, is recommended here.

The stand and interior model building must be made up from some composition impervious to water, as water is used to fill the bowl. There are several compositions quite suitable nowadays, and readers may have their own choice in the matter. Perhaps Pyruma would suit as well as any, if any doubt about a suitable choice exists. The exact size of the stand will depend on that of the glass bowl available, which should be on the small size, somewhere about 4ins. to 5ins. diameter, say.

A hexagon shape for the stand will be easy to work, and its dimensions can be estimated by the following method, as depicted in Fig. 1. On a sheet of paper strike the two concentric circles shown at (A), the inner circle being a trifle less in diameter than the opening of the bowl, and the outer circle a little more than that of the rim. Outside these strike a third circle about 1in. larger all round. Step off the radius of this circle round the circumference, and join the points to make the hexagon.

The ring (A) should be cut out of ¼in. or ⅜in. thick fretwood. Glasspaper the edges of this and lay it aside. Now, on a piece of greased board, roll a layer of the cement to about ½in. thickness. Lay the paper shape on this and trim the cement to the shape.

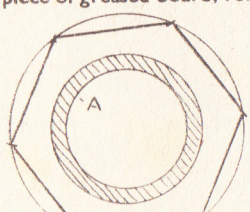


Fig. 1—Marking the base

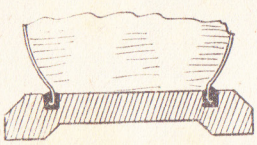
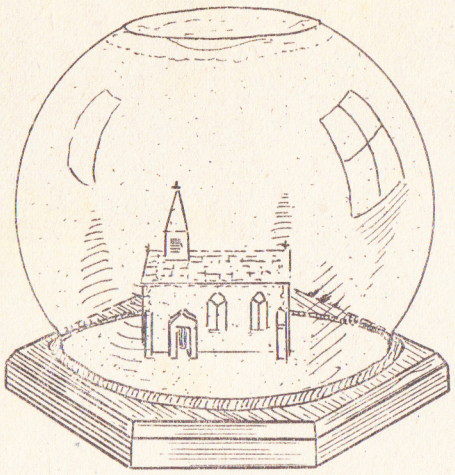


Fig. 2—The bowl fixing

In the centre lay the fretwood ring, and fill up with the cement, lay more on the outside of the ring and level all off. Now remove the ring, and a circular groove will be left, into which the rim of the bowl will be, afterwards puttied in. Bevel off the edges of the hexagon.



This is the stand, and in the centre part the model building will be erected. Readers may well have their own ideas on this subject, the model village church, shown in the general view, and in detail Fig. 3, being but a suggestion. Pyruma cement is quite easily modelled, and even the tyro need not fear to make up something as simple as that shown, or perhaps, a small thatched country cottage.

The church is seen in Fig. 3 as a solid moulded block, with its porch and bell steeple modelled separately and stuck on while the cement is still plastic. The windows and other details are marked on the cement with a pointed stick. The size of the model should not be too large, quite a small one will allow the 'snowstorm' to be more effective.

The stand and model completed should now be baked to stone hardness in the oven. Be careful not to distort the shape during the work, and before placing it in the oven, try the bowl to see it fits quite easily in the circular groove.

When dry and hard the model should be painted or enamelled. The groove should also receive a coat of paint to make the putty adhere better. The stand can be done at the same time, or left until later when the bowl is fitted on. A paint or enamel unaffected by water must be used; best to enquire about this when purchasing the stuff.

When the paint is quite hard, partly fill the bowl with distilled water, which can be bought at any chemists, and invert the stand and place it on top. See the quantity of water is enough when the model is in it, to nearly, but not quite, fill the bowl. Now decant the water carefully and pour it into a wide mouthed bottle provided with a cork.

As purchased the 'frost' may be a little too coarse, it should be folded into a cloth and further pulverised with a rolling pin. A quantity is then introduced into the water. Cork the bottle and shake up, then invert the bottle and watch the snowstorm effect as the frost settles down again. You can then see if enough frost is present to give a satisfactory effect, or if more is required. All being well, empty the water and frost back into the bowl.

Ordinary putty would serve to fix the bowl to the stand. Knead it well between the fingers until soft, then press it into the groove. Invert the stand, etc., and press down on the bowl firmly. With the hands still pressing both together, turn the bowl right side up and without lessening the pressure, get a kindly assistant to press the putty well round the rim of the bowl and up to its side, and then level off. Be quick over the job, and invert the whole again. Place a weight on the stand and leave for some days for the putty to get hard.

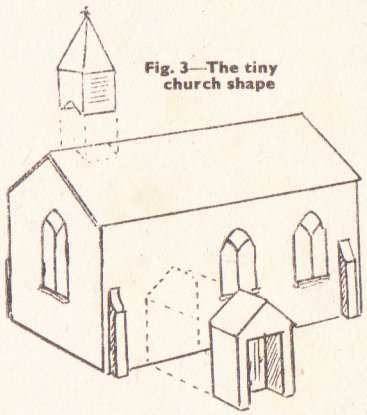


Fig. 3—The tiny church shape

A section of the stand, with the rim of the bowl puttied in the groove, is shown at Fig. 2, which will explain the business better than a written description. Obviously the puttying in must be satisfactorily done to prevent the water in the bowl from seeping through.

From Fig. 2 it will be noticed that the bottom of the stand is hollowed a little, and not quite flat all over. This is considered an improvement, preventing to a great extent, a tendency on the part of the stand to not bed down quite flat as it should do if it becomes ever so slightly distorted after modelling.

The hollow shape is formed during the modelling process by the simple expedient of laying a disc of fretwood on the modelling board, and pressing the cement round and over it.

When completed, the putty should be enamelled or painted to match the rest of the stand, and should make an interesting novel ornament.

Circuits and hints for operating and controlling
MODEL MOTORS

ELECTRIC motors are used for working all kinds of models, including trains and boats, and to get best results in all circumstances a number of points require to be kept in mind. These are set out here, together with means of reversing, speed-control, and so on.

Reversing Circuits

In many models it is a great advantage to be able to reverse the direction of rotation of the motor at will. Some of the more expensive motors are fitted with reversing switches, but many of the cheaper types are not, and it is here that a switch can be added with advantage.

Fig. 1 shows how a motor with a wound field coil (e.g., not having a permanent magnet) can be reversed. The direction of rotation of the armature depends upon the magnetic polarity of the armature and field magnets. When the double-pole double-throw switch is thrown to the right, current goes from (B) to (C), and from (E) to (F). When the switch is turned to the left, current goes from (B) to (A), and from (E) to (D).

If connections are followed it will be seen that this reverses the direction current flows through the field coil. Magnetic polarity is, therefore, reversed, and also the direction of rotation of the motor.

In a motor without means of reversing, the field coil leads will go directly to the brushes. These are accordingly detached, and new connections added, as shown, using ordinary thin flex. The switch can most conveniently be mounted on the motor.

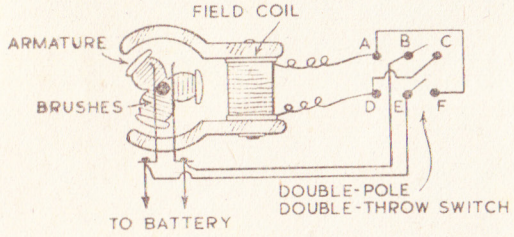


Fig. 1—Connections for reversing switch

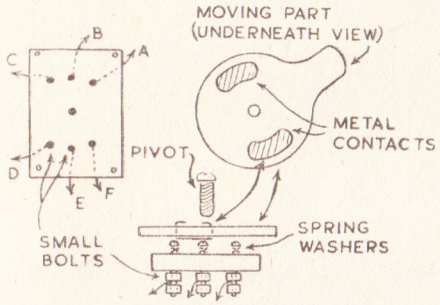


Fig. 2—Type of reversing switch

Some motors have the field winding in series with the brushes, instead of in parallel, as shown. Where this is so, do not put a lead between the one brush and (B). Instead, simply take a connection from (B) to the battery.

Permanent Mag Motors

Some small motors have no field coil, a horseshoe permanent magnet being used instead. With these, direction of rotation can be reversed by reversing the polarity of the current supplied. This can be done by employing the same type of switch anywhere in the two leads between battery and motor.

Connect (B) and (E) to the battery. Connect (A) and (D) to the motor. (D) and (C), and (A) and (F) will be wired together, on the switch, as shown in Fig. 1. If the switch has a central 'Off' position, this can be made use of, of course.

Making a Switch

Six round-headed 6 B.A. bolts can easily be obtained, and a switch made on some oddments of ebonite or wood, as shown in Fig. 2. The size may be adjusted according to the motor, but a small base 1½ins. by 2ins. will be amply large. Clearance holes for the small bolts are drilled in this.

A disc with operating lever, cut from 3-ply or similar material, is pivoted on a centre bolt. Two small pieces of metal are affixed to this, as shown. This can be done by passing the ends up through slots or small holes. When the switch is in one position these metal pieces make contact between (C) and (B), and between (E) and (F). When the switch is turned the other way, contact is made between (B) and (A), and between (E) and (D).

Small spring washers are placed under the bolt-heads to maintain good contact. The metal contacts should not be so long as to span terminals (C) and (A), or (D) and (F), when in the central position. Connections will be seen from Fig. 1. Two short leads at the back of the switch connect (A) and (F), and (D) and (C).

This switch can be used with permanent magnet motors, or with wound-field motors operated from dry battery, accumulator or mains transformer.

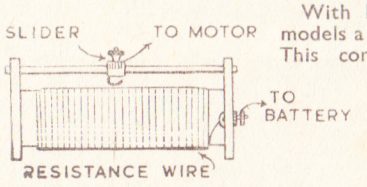


Fig. 3—A resistance speed controller

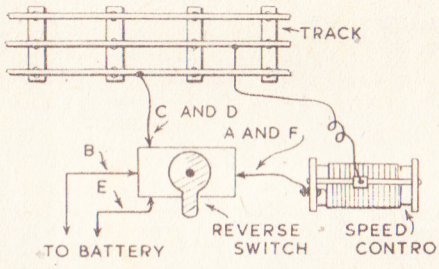


Fig. 4—Model train speed and reversing circuit

Speed Control

With boats, trains and many other models a speed-controller is very useful. This consists of a resistance which reduces the voltage for slower running. A simple type to make up is shown in Fig. 3. A piece of wood about ½in. to 1in. in diameter and 2ins. to 3ins. long forms the body of the controller. Small 3-ply ends are screwed to this, and a springy brass slider, cut from scrap metal, arranged to move on a metal rod. (Here, a large nail cut off to the required length is suitable).

The resistance wire element is wound *tightly* on the body of the controller. If the latter is varnished, and the wire wound on immediately, this will hold the turns secure when the varnish dries.

Thin iron wire such as used for binding flowers is suitable. Copper wire can be used, but rather a long length will be necessary, as it is of low resistance. The more wire brought in circuit, the slower will the motor run. It is best to make a trial with a length of wire to determine how much is required to make the motor run as slowly as possible. This length can then be cut off, and wound on the controller, the turns being spaced, if

(Continued foot of page 246)

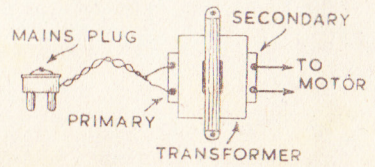


Fig. 5—Operating from A.C. mains

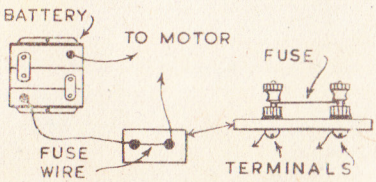
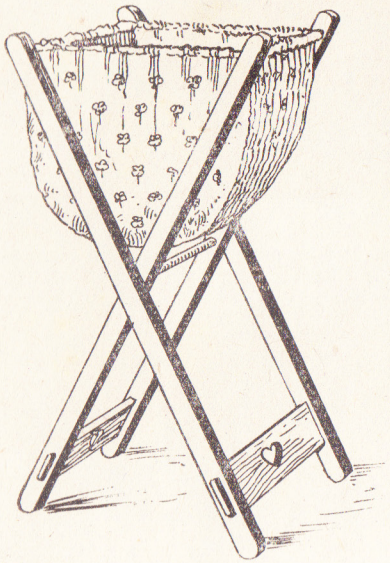


Fig. 6—Adding a fuse in circuit

Any lady would be delighted to be presented with

A FOLDING WORKSTAND



HERE is an article of real usefulness that should please the ladies. Such a workstand as that shown in our illustration would make a splendid gift, and as there is really very little in the making, it can be done quickly and the flat surfaces easily polished to give a brilliant effect.

Two Frames

The stand itself is made of two distinct frames consisting of ¾in. square wood held together by wide rails at the feet and ordinary round rod at the tops. The squared stuff, of which four pieces will be required, may be purchased from Hobbies at 11d. per length of 3ft. It is of sound knot-free stuff and planed ready for immediate use.

The ends of all the pieces should first be rounded off and glasspapered. Then place them together side by side and mark the positions of the holes for the cross rods and the mortises across all four. The mortises are to be cut 4½ins. from the ends and 1½ins. long, as the detail sketch shows.

As ¼in. thick wood is suggested for the wide rails, the mortises will, of course, be ¼in. wide and they may all be cut in with the fretsaw quite easily. Particular care must be taken in setting out the frames to see one fits inside the other.

One will, therefore, measure 14ins. inside the rails, as seen in Fig. 1, and one 12½ins. These two measurements will thus be the lengths of the wide rails without the projecting tenons, 1in. being allowed on the ends of each for them.

Rails

The rails should be 3ins. wide, and if, desired, a simple fret could be cut in the middle of each to add to their appearance. As the cross rods are ⅜in. diameter, the holes should be bored with the brace and bit. The ends of the rods are brushed with glue, pushed through and cut and cleaned off neatly on the outside.

Check the measurements carefully before cutting off, and see that the shoulders of the tenons on the wide rails fit neatly and closely to the legs. The tenons should be dowelled with ⅛in. dowelling rod, the holes for them being bored clean through with an ⅛in. twist drill. The ends of the pivot rod which passes through the centre of the frames must be glued firmly into the outer or wider of the two frames. It passes freely through the holes in the smaller frame so both will swing easily for folding and opening.

The illustration shows how the sewing bag is to be made. A stout silk cord is fastened on each side rod and the material forming the bag gathered on the cords. The strips of material forming the bottom and sides of the bag are either closely pinned to the cross rods or again gathered to cords, and the latter then fastened to the rods.

Suitable Finish

The finish to the wood must, of course, be made before the bag is attached, and we would recommend a light mahogany stain and polish.

Some may prefer to treat the wood with ebonising solution and then coat over with varnish or polish. The stand forms a simple piece of carpentry, and the amateur as well as the professional should make a note of its suitability as a gift.

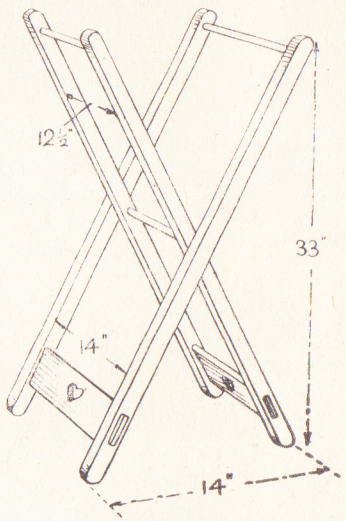


Fig. 1—Details of frames and pivot rail

Model Motors—(*Continued from page 245*)

necessary, to occupy the whole length of the latter.

Model Train Circuit

Most model train motors are of the permanent magnet type, so the circuit shown in Fig. 4 will enable the train to be started, stopped, reversed and its speed controlled, at will, without the engine itself being touched. Current is, of course, picked up from the track itself, and the insulated centre rail. By referring to Fig. 2, the connections to the switch will be seen.

Mains Operation

As it is much more economical to take current from the mains, many model-builders take advantage of this, when possible. A mains transformer is used with a primary suitable for the house voltage (usually 230 to 250 volts), and a secondary giving the output required by the motor. (6 volts, in many cases). The primary should be fed from a proper mains plug, with good quality insulated flex. If the transformer is a good one, with sound insulation, no danger of shocks will exist at the *secondary* side of the circuit.

It must be remembered that transformers cannot be used with direct current mains, only with A.C. (alternating current) supplies. In addition, permanent magnet motors require direct current, so are not suitable for operation from the mains, unless some form of rectification is employed. But if these two requirements are remembered (the supplies must be A.C., and the motor have a wound field-magnet) a transformer can be used with success. Running costs will be very low.

Circuit Safeguards

With dry batteries, an accidental short (such as may arise if a model train is de-railed) will run down the battery rapidly. With a transformer, such a heavy current may flow that, if allowed to continue for any length of time, the transformer may be damaged. With an accumulator, very heavy currents may also flow, eventually damaging the battery.

These troubles can be avoided by including a fuse, as shown in Fig. 6. It is merely connected in one lead from the transformer secondary of battery, and can be made by mounting two small terminals on a small piece of insulated material. The fuse-wire, obtainable on small cards from almost any electrical stores or shop, is placed between these terminals, which are then screwed down. When a short arises, this fuse burns through, thereby protecting the circuit.

A Novelty toy for a youngster's birthday is

THE ZIG-ZAG RUNABOUT

HERE is a toy to give great pleasure to the younger nursery-age child. As can be seen from the photograph and drawings, it consists of a framework upon which are four sloping runways. A roller—(a cotton reel suitably treated—is placed at point (A). By gravity it runs down, falls through a hole at (B), and so down, through another hole at (C) and at (D) and so down to (E).

Young children find it fascinating to watch the roller descending, and it makes a pleasant whirring noise, too. They are given exercise in manual dexterity by the replacing of the roller each time. But if this fun should temporarily pall, children can push the whole thing round, as it is mounted on wheels and gaily painted.

Sturdy and Strong

Normally, anything made for children should be light enough for them to handle but in this case a certain substantial weight would not be a disadvantage, as children are not to be encouraged to push it over or lift it. They will probably sit on the top. Fortunately, by the very nature of the model with its structural steel-like cross-bracings and 'gussets' it is very strong.

Provided the functioning of the model is perfectly understood, the dimensions as given can be altered. Even if followed exactly, a little adjustment is sure to be necessary. The whole job, however, is essentially quite simple as befits a nursery toy and does not depend on critical fitting.

Start with the uprights (1), of which two are required, 18ins. by 2½ins. by ¾in. Any kind of wood can be used, even several different kinds, as the whole job is afterwards painted. The top (3) is of 13½ins. by 2½ins. by ¾in. wood and the base (2) is of the same section but 19½ins. long. A pair of screws at each joint will hold the job firmly together. Before screwing up, however, round off the top outer edges of parts 2 and 3.

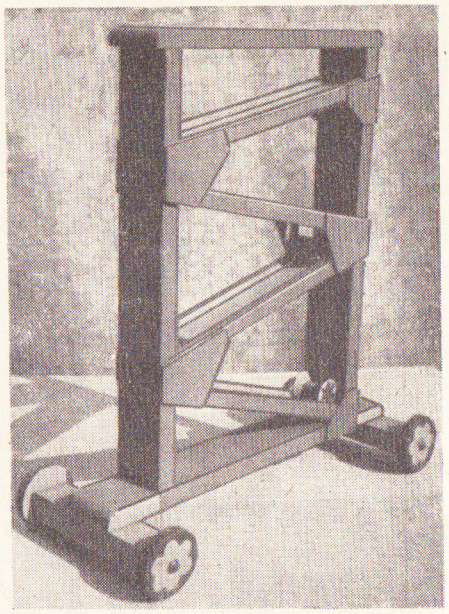
Blocks 4 may now be screwed on; they are each 6½ins. by 2ins. by 1in. They overlap 2ins. as shown. The overlaps for parts 2 and 3 can be seen dimensioned in the drawing. The inside width of the frame is 12ins. Well countersink all screw holes, and where they show, as at the top, sink deep and cover in with plastic wood.

The Runways

Each of the runways is made up of a 2½ins. wide strip of ⅜in. thick wood, the length of which varies a little, but might be cut at 12ins. and trimmed as required. On each side of these runways goes a rail, made of ⅜in. square stripwood glued and tacked on. Note, from Detail X that at one end, the stripwood comes flush with the end of the wooden runway, but at the other, each strip projects about 1¾ins.

For simplicity, the end of the runway at the end where the side strips project, is shown with a square edge in Detail X. Actually it is well rounded over as in Detail W. Each end of the sloping runway will have to be bevelled a little so as to fit snugly within the square frame (see Detail Y).

The runways are held in place by gussets of ¼in. plywood. At first, however, any small pieces of ply can be used and tacked quite lightly so that adjustments to the runways can be made quite easily. The dimensions as given should be followed as closely as possible.



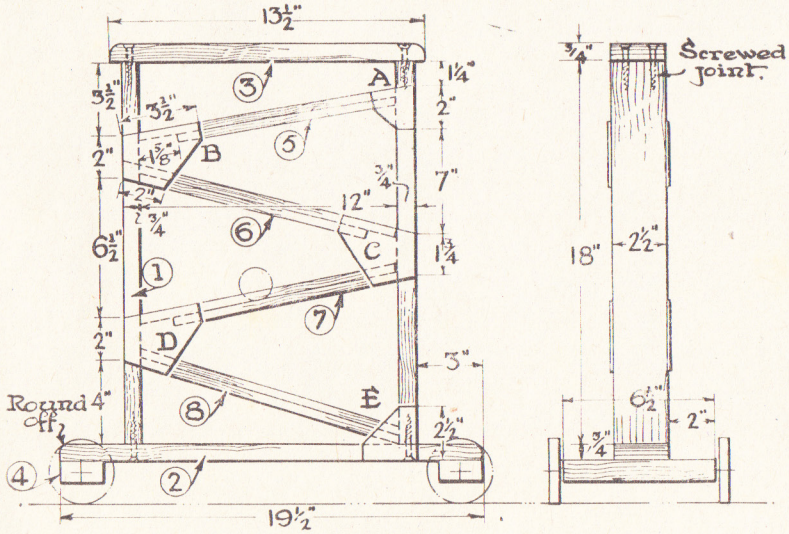
It will be appreciated that these apply to only one size of cotton reel.

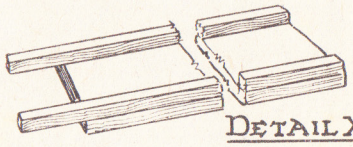
Rolling Reels

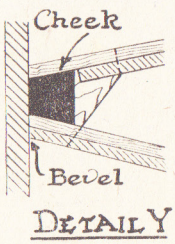
That used by the writer was exactly 1½ins. diameter and 1⅝ins. long. It must run freely down each runway without side turning and jamming, and fall easily through the hole and on to the runway below. The gap through which the reel falls is about 1⅝ins. long.

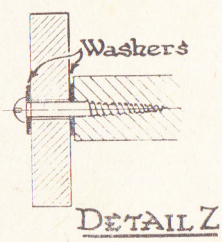
The gussets are best marked off from the actual job, i.e., whilst one side is temporarily tacked, a shape can be pencilled off from the other. The size of the gussets is not critical. The dimensions given at point (B) can be taken as typical. At the lower right-hand corner of the frame, a square gusset with the corner cut off is used.

In testing, it will be found that 'cheeks' are needed inside the gussets at the point where the reel falls through the runways. One of these is illustrated



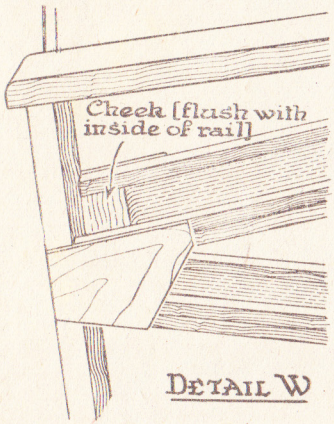






at Detail Y. The idea, of course, is to preserve the same width of runway even at the dropping-through places. The size and shape of these 'cheeks', is best off from the actual job. They are then glued inside the gussets. The gussets themselves are fixed to the rails and the runways with small panel pins and glue.

Detail Y represents a section through the runways at point (B). When the



DETAIL W

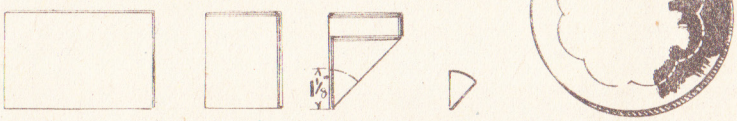
model has been made, the function of the cheek pieces as typified in this detail will become clear.

Four wheels are required. The writer used discs of ⅝in. plywood, 3ins. diameter, which were being sold as offcuts and, with a little trimming, made excellent wheels. Ready-made wheels of wood or metal are, however, easily obtainable.

Before fitting the wheels, however, the whole job is well glasspapered up, taking particular care that all sharp edges are well rounded off. In normal cabinet making it looks very slovenly to have square edges dubbed over, so that one always uses a proper glasspaper block. But in the present case, give all edges a deliberate rubbing over so there is no possible chance of splintering. Where young children are concerned, one cannot be too careful.

Colouring

Go over first with a priming coat of aluminium paint, and when this is quite dry, go over with *bright* enamels. For children's toys avoid sombre browns or dark blues, etc. The model illustrated



Stages in decorating the wheel

was painted in gay tones of light green, blue and orange.

A short description of painting the decoration on the wheels might be given, as the principle applies to many other toys. A piece of scrap paper was folded first in half, then in half again and then diagonally (see sketches). It is then cut as shown. When opened out, a regular design is seen.

Paint each wheel yellow all over. When dry, place the template just made over, holding down, if necessary with a small smear of soap, and taking care that the pattern is central. Now, working always from the centre outwards, and using as little paint as possible, and as stiff as possible, paint the remaining part of the wheel in blue. A spray gun would be even better if available.

It is best to make four such patterns, one for each wheel. When the paint is dry and the patterns removed, it will appear as though one had painted the pattern with great skill in yellow on blue.

Use *long* round-headed screws for fixing the wheels. Under the head of the screw and between the wheel and its mooring (part 4) put a washer. The wheel should turn readily but not shakily on its axle (Detail Z).

The cotton reel will work better if an iron rod is forced into the central hole and neatened off by filing.

Renovating Leather

I HAVE just finished doing a leather suite, and want to renovate the material. What do I use? (H.R.—Erdington).

OLD leather is almost impossible to restore to its original state, because being a porous material it absorbs dirt and grease, and the innumerable substances which stain such a material. These stains and discolourations being deep seated, cannot be removed by any surface application or cleaner, although, of course, they do improve matters by removing a good deal of the surface grease, etc. One method which may help, is to make a paste of fullers earth and methylated spirit, apply it thickly to the surface and leave to dry, then brush off. Another plan is to use a large piece of ordinary dough (made with flour and water) and rub it thoroughly over the surfaces.

* * *

Baby's Bath

I HAVE one of the baby's baths made of papier mache. What is the best way to renovate this? (A.S.—Dagenham).

IF there are worn patches on the bath, cover these with a coat or two of good quality paint. Allow to dry and then apply two coats of good quality bath enamel. Make sure one coat dries thoroughly before applying the second. Let the enamal harden before use.

Cloudy Aquarium

I HAVE an aquarium complete with air pump, plants, etc., but keep having trouble with the water going cloudy. I have tried both rain and tap water. Is it possible to make some sort of filter to prevent this? (J.G.—Handsworth).

IS your aquarium overstocked? It is always better to understock than the other extreme. Evidently you have the necessary plants, etc., and, therefore, the trouble seems to be in the water. You could try filling the tank with 50 per cent clean rain water, plus water from the domestic boiler supply, or better still, with boiled water. To fill the aquarium you can, with beneficial effect, use a length of thin rubber tubing, and with this to siphon the water from a bucket into the tank. Specimens must not be put into the tank until the water has stood for at least 48 hours. No discarded fragments of food or other refuse should be allowed to remain in the tank. Clean it out with a siphon, one end of which can be run over the bed of the tank to suck up all waste matter. Do this periodically. Or, as another precaution, you can filter the water by allowing it to drip or drain through a flower pot sand-filter. Get a large flower pot and three parts fill with clean washed sand, for this purpose. When troubled with fouling of the water, partial or complete change of water, or filtration through activated charcoal may be tried, as the solution to the trouble. When adding to or changing the water, care should be taken to ensure that the new water is of the same temperature and is obtained from the same source as the old. Sudden changes of temperature must be avoided.

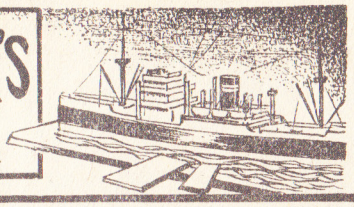
* * *

Re-Binding Books

CAN you let us have an article on re-binding books which have been badly used? We try to 'mend' books so that they may be of service to old age and hospital institutions. (R.K.—Enfield).

FOR such work as you contemplate, you cannot do better than get *Bookbinding*, published by Cassells Ltd. This deals thoroughly with all branches of the craft. For repairing, the book is taken to pieces, then the sections separated, the loose leaves gummed in and then the sections resewn together. If you can trim the edges again, all the better. A soft cover can be made with American cloth, Rexine or plastic imitation leather, lined with linen. If the book is required really strong, to stand some wear, re-bind with a linen hinge as explained in the instruction book mentioned. The material can mostly be obtained from a good-class stationer.

The SHIPMODELLER'S Corner



Elizabethan Rigging

by 'Whipstaff'

IN this article I am going to deal with the rigging of Galleons of the Elizabethan period in a simplified form, for the smaller models of our period kits. Later, in our corner, I will deal with the same subject and its application to larger and accurate scale models.

In small models it is difficult to make the necessary blocks and fittings for detailed rigging without them being overscale. It is intended that this first approach to the rigging of model ships will be an introduction to the rigging of models in an authentic manner and thus lay the foundation of a real knowledge of the subject.

Do not be satisfied with the mere placing of a few cords here and there to represent rigging, for the rigging plan is one of the beauties of a sailing ship. Indeed, the delicate tracery of the rigging against the sky when the sails were furled, especially in ships of the 18th and 19th Century, was a magnificent sight and well worth the effort of capturing in a model. Why spoil a good job of craftsmanship in your hull by poor work above deck?

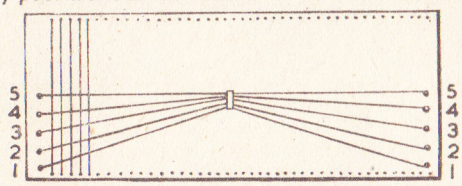


Fig. 1—A jig for shrouds

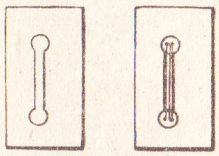


Fig. 2—Deadeye jig

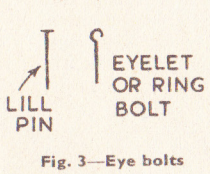


Fig. 3—Eye bolts

It is really quite simple to see that however small or simplified your model, each cord is right. On board, every rope has a definite purpose to fulfil, and for your model to look right, the rigging ropes must look as if they will fulfil their purpose. Tools for rigging can be of the simplest—a small pair of embroidery scissors, a single edged razor blade, a long pair of dental or philatelic tweezers and a pair of long nosed pliers. With these tools rigging can be accomplished and all those small knots in awkward places can be tied quite easily.

Now to material. In most kits, for reasons of simplifying the making of a model, hanks of cord are supplied all the same size in diameter. This, of course, is not correct ship practice, normally the heaviest rope is that which goes to make the standing rigging, and the higher you go upwards the lighter the rope used.

In a simplified model quite a good effect can be achieved by the use of two sizes of cord, one for the standing rigging and the lighter for the running rigging and ratlines. Experienced modellers who wish to be exactly to scale often make their own ropes on a miniature rope-making machine.

To guide the average ship modeller the following will give a good guide to the sizes to use. Shrouds, stays and topping lifts—good quality fishing line, or the cord usually supplied in Hobbies kits. Halyards and sheets—heavy linen carpet thread. Downhauls and all light lines—fine natural colour sewing thread.

Remember, all standing rigging black and all running rigging natural colour or light brown. Not white. To stain your standing rigging, use indian ink, or, better still, rub with cobbler's black wax. This will give an authentic appearance and preserve your rigging. All standing rigging was tarred.

To stain running rigging use cold tea (no sugar or milk, of course), and this will give the right shade of brown. Always stretch your cord before use to prevent any sagging after your model has been completed for a few months. This can be done by cutting into suitable lengths and hanging from a hook in your workshop with a lead weight attached to the lower ends, leaving for a couple of days to take all the stretch out of it.

One golden rule to follow if not working on a detailed scale model, is to keep your ropes light in weight. A heavily rigged model, where the ropes are too thick looks very poor. If working on a scale model, you will, of necessity, make your ropes to scale.

It is essential to use a smaller thickness of cord for your ratlines than you have used for your shrouds, if the appearance is to be correct. The ratlines must also be made to sag a little as if by the weight of the members of the crew continually running aloft. Lying in a straight line across the shrouds they look artificial. After fixing shrouds, depress rather slightly.

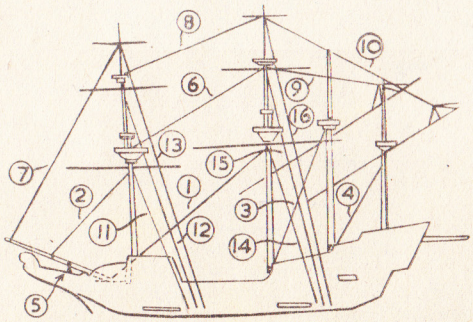
As this article is mainly to assist in rigging the smaller models in our series, I will not deal with actually tying the ratlines to the shrouds in correct ship fashion. This will come later in our series, but for our purpose we will make them on a jig.

For Hobbies smaller models space your ratlines about $\frac{5}{32}$ of an inch apart. This is very near scale and the effect is quite realistic.

To make a jig for this purpose, see Sketch 1. It consists of a piece of plywood long enough to take two sets of shrouds with a little over to allow extra length for seizing the deadeyes. In the

KEY TO SKETCH 4

(1) Mainstay.
(2) Forestay.
(3) Mizzen stay.
(4) Bonaventure stay.
(5) Gammoning.
(6) Main-topmast stay.
(7) Fore topgallant stay.
(8) Main topgallant stay.
(9) Mizzen spar stay and bridle.
(10) Bonaventure spar stay and bridle
(11) Foremast backstay.
(12) Fore-topmast backstay.
(13) Fore-topgallant backstay.
(14) Mainmast backstay.
(15) Main topmast backstay.
(16) Main-topgallant backstay.



BACKSTAYS OF PORT SIDE ONLY SHOWN

SHROUDS OMITTED FOR CLEARNESS

Backstays are two in each case, leading from mast top and finishing one on each side of ship. Fasten to eyebolt in hull aft of, and level with the channels. Only port side backstays shown in Sketch for simplicity, and shrouds left off. No backstays to mizzen or bonaventure mast.

GAMMONING SEIZED IN CENTRE

exact centre drive in a small staple from an office stapling machine, or make one from wire. The staple is about ⅜in. long and to stand about 1/16in. above the surface of the plywood.

On the face of the plywood draw your shrouds as they will be on your model and in the plywood edges at the end of each shroud drive in a fret pin. Take the size of each shroud from your model with the masts stepped, using a pair of dividers or a ruler. Along the other two edges of the jig step out your spaces for the ratlines and drive in small fret pins at these points.

Taking your heaviest cord, stretch your shrouds from fret pin 1 on one end, through the staple and fasten to fret pin 1 at the other end. Do this with each shroud.

Next stretch your finer cord, for ratlines, from pin to pin across the jig and drop a spot of cement on each point where the cords cross, leave to set and, if not already stained, paint black with a flat egg-shell black. Finally, when completely dry, cut out your finished 'ladders' with your razor blade, neatly.

While these are drying you can set up your deadeyes in the channels, attaching the strips or cords to staples or fret pins in the hull, as directed in your kit instructions.

Do not drive your staples or pins completely home until your shrouds are in place. If you drive them home after you have reeved your lanyards and tightened your shrouds in place, you will ensure that your shrouds are properly taut. Note: shrouds to bonaventure fastened to deck inside bulwarks. By using the jig in Fig. 2, made of thin plywood or fibre, you will draw your deadeyes so they finish exactly level, as they should do. Do not, for this period, fit sheerpoles; they are a fitting of a later period.

If you have any problems or difficulties send them along to 'Whipstaff'. He will be willing and able to help you.

Our next operation is to make a number of small eye bolts. Do not use brass screweyes for the purpose, as they are usually overscale and look out of place.

To make your eye bolts use bank or 'lill' pins. Cut off the head and use your long nosed pliers to turn them around a nail, as in Sketch 3.

These are to be driven into the deck where your rigging lines are to finish.

Having got our shrouds into place we take the rigging (Sketch 4), and proceed with the rest of our standing rigging.

Commence with the mainstay (1). This is double and passes each side of the foremast. It is led from the mainmast top and passes through two small holes bored through the bulkhead, sometimes through deck and bulkhead at an angle to allow it to be secured to the heel of the bowsprit.

Next fix the forestay (2), mizzen stay (3), bonaventure stay (4) and so on, until your model is completely rigged as regards standing rigging, follow the rigging plan in Sketch 4, putting your stays on in the order in which they are numbered, all stays except the mainstay, are single lines.

You will now have the satisfaction of having your model rigged so far in correct and authentic fashion and can proceed with the running rigging when you receive your copy of 'Hobbies Weekly' with the second part of our article.

The handyman will be interested in these further HOME IMPROVEMENTS

THERE are bound to be wet shoes where there are several children in the house and it is unwise to dry them by a fire. The best place to put them to dry is on a rack over the door where they can dry off slowly and are right out of the way.

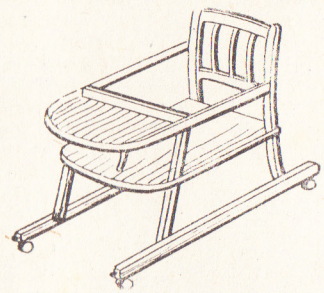


Fig. 1—A baby's runabout chair

The shelf should be open and made from 1in. by ½in. wood with three long sections to go the width of the door and about eight lengths to go crossways and make the width. Arrange to have the two short sections nearest the end one, so spaced that the brackets can be fitted to these and then down to the door surround. The underview at Fig. 2 shows the shelf and brackets in position above the door.

The width of shelf only need be about 9ins. to take all shoes. Height should be so you can get on a chair and reach the shoes when wanted.

When a baby becomes a toddler, it rather spurns the usual high chair but you can improve its temper by making the old one quite mobile, as you can see in the drawing at Fig. 1.

Cut off the legs of the high chair about 4ins. below the seat or at least so he or she can get its feet on the floor. Now fix two battens about 2ft. 3ins. long by 2ins. by 1in. on the outside of the short legs. Extend these so there is no chance of the chair over balancing.

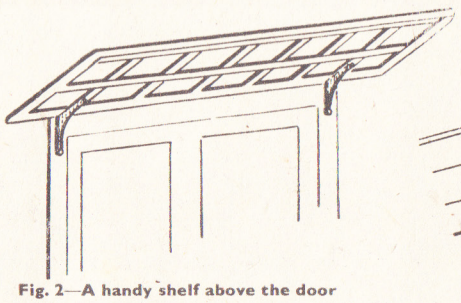


Fig. 2—A handy shelf above the door

You can now add four cheap castors to the runners and some rubber buffers at the ends to save damage to the skirting. You can also add a short length of ½in. dowel rod in the centre and from the tray to the seat to protect the child from slipping through.

There may be a space where you want a small table and you have not much space. Here is a chance to use up a few boards and find a couple of old table legs from the junk shop.

The main idea is to get a wide board for the centre to which you firmly screw two table legs. These legs are in turn fitted to two wood blocks about 12ins. long. If you can bore out the holes and let the legs in so much the better, as they will be stronger. You could cut the holes right out with a heavy fretsaw but you must have heavy wood for this part.

Having fixed this up the side, dropboards can be hinged on and supported by 1in. square wood, as shown in the small sketch. When not in use it will always stand up against the wall and take up very little room. (234)

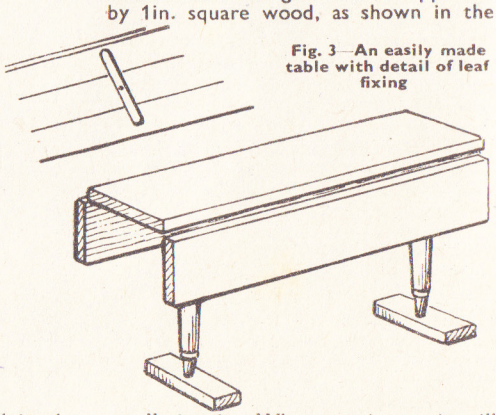


Fig. 3—An easily made table with detail of leaf fixing

A continuation of our article about surprising modern

USES OF THE CAMERA

IN our regular photographic article last month we spoke of the amazing way in which the modern commercial and high grade camera could be used in a number of inquisitive ways. Here are some more.

Yes, the camera is a true sport and is always in the forefront of any sporting event, be it football, cricket, boxing, motor racing or any item of public interest where large crowds are attracted and where those who are unable to attend will expect to see a picture o it in their usual paper.

Some years ago the author managed to get a print showing the impact of a gol club on a golf ball. It was taken by high-speed photography, one five-thousandth part of a second was the exposure time, and it showed the club just striking. It was remarkable how that side of the ball was flattened while in the process of being struck.

High-speed photography is being used in many branches of scientific research and is proving most useful and satisfactory. Records can be obtained of almost any high speed action too fast for the eye to recognise. A shell is leaving a gun or a bullet from a rifle, the impact of a bullet fired through a plate glass window, the bursting of an airball are some of the many wonders of this type of camera work.

Criminology

The inquisitive camera is doing excellent work in the tracking down of criminals. Once a man or woman has had his or her finger prints taken, that photographic record is stored and kept in the library for future reference if needs be. The forger, too, cannot get away with his illgotten money so easily as he used to, simply because the photographic plate can show very clearly and conclusively that a signature or figure has been tampered with, yet the human eye could not detect it.

The police force is well provided with cameras and have found a valuable use for them in placing the cause of road accidents to the right persons. A simple example is that of two cars colliding. Photographs, if taken soon after, should show the wheel tracks of each vehicle, proving whether one car was over the white line and whether a skid was responsible.

Educating Children

It is probable that much more will be heard of this work in the future and also in demonstrating to children how to avoid running risks where traffic is heavy. Some local authorities display some very good photographic posters of this subject.

Children, of course, need educating and the camera is one of the most efficient teachers we can possibly have. It is the medium by which the eye becomes the means of imparting information to the brain and visual training has been found to be more effective than the aural method. When the two can be combined in an interesting manner, not only does the child's mind grasp more quickly and readily, but the teacher finds considerable less fatigue in his or her work.

After a series of demonstrations were given in a number of schools and colleges extending over a period of six months, approximately 150 projectors were ordered and installed.

Medical Methods

This method of passing knowledge is also in vogue in a number of medical and other institutions where specialised training is the main feature and the demand for the apparatus is on the increase. What a boon it would be if more educational films could be shown on the screens of cinemas!

Cinemas are the places where our minds are able to relax and where we can enjoy drama, comedy, tragedy and pantomime or the beauty of nature depicted in the travel films. The wonders of the world as seen by explorers and globe trotters, the habits and customs of people in all countries. Current and events of the past, together with many other items of an entertaining and instructive character are brought home to us and all produced by that ever-inquisitive piece of apparatus, the camera.

Documentary Copies

It would be possible to dwell on many other important and useful doings which have as their beginnings the work of the camera or a photographic process. Such as the copying of documents, plans, legal papers, registers, policies, etc., all part of the routine work of banks, museums, insurance offices, government departments and similar places. Photographic records of cathedrals, churches, town halls, monuments, ancient and treasured places, and buildings of historic or national value, are being collected for the benefit of future generations.

The Postmaster General could open our eyes very wide if he published the number of letters that have been air-graphed since this scheme came into vogue. The figure must be collossal; another example of the great usefulness to mankind of the camera.

Colour Work

It is difficult to foretell what the inquisitiveness of the camera will yield. We have not mentioned its probings into the realm of colour, but it is recognised that marvellous progress has been made already and that great things are promised. But, surely, enough has been said to convince anyone that photography is no longer only a hobby for men and women to indulge in during the summer holidays or any spare few moments. No, it is something of great national and international importance. Its value to every man, woman and child of this age and of posterity is incalculable, for not a day passes without we benefit by its influence in some way or another.

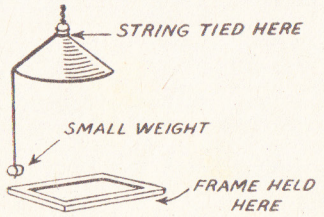
Your Own Use

In conclusion to those who possess cameras. Do try to make them more inquisitive. Use them in such a way that you cannot fail to learn something. And just a word to those who have not got a camera. It is this:—you are missing a lot of real pleasure.

If you are still young and have not started out in the world, perhaps not made up your mind as regards the future, we would remind you that the world of photography is very vast. Many thousands of men and women are employed in it and a large number have reached positions equal to many occu pying high places in the 'professions'. There are schools where the practical, technical and mechanical side of the art are being taught and there are many open doors for those who wish to make it their career.

Prints by Electric Light

WHEN taking prints by the aid of electric light, it is a good practice to tie a piece of string, say, about 2ft. long to the wire at the top of the shade. By holding printing frame level with the bottom of the string, a constant distance from the light is thus obtained, and if a number of prints from the same negative are wanted, the correct exposure having been found, the prints will be equal.



Broken Filament

IF a metal filament should burn out in your electric bulbs, do not throw them away without first giving them a few smart taps while the current is on; the parts of the broken filament might touch and weld themselves together.

Many ways in which the home mechanic can use the FLEXIBLE DRIVE SHAFT

MANY readers at some time or other require some form of mechanical contrivance to carry out jobs just outside the scope of the usual hand tools. The choice may lie between a lathe, a drilling machine or just a polishing head. The trouble with most of these machines is that they are limited in their usefulness.

A small lathe is limited for size, the scope of a drilling machine is small, so is that of a polishing head. What is needed is a universal tool that will perform any of the jobs that the home mechanic is likely to encounter, whether it be in the field of model making or jobs about the house.

Now a small electric motor with a flexible drive is about the most useful and versatile piece of equipment that the handyman can have. The number of accessories and the amount of equipment available is enormous and by making attachments and rigs, the versatility of the machine can be extended far beyond that of any other piece of workshop equipment.

The Machine

While it is possible to obtain ex-government stock in the form of small electric motors and flexible drives, which in the end may prove very useful, it is the author's experience that it is far better to spend a little more money initially and get the best and most suitable equipment.

Fig. 1 shows a suitable machine, specially made for the home mechanic and model maker. The motor is $\frac{1}{16}$ H.P., 230/250 volts, universal A.C./D.C. running at a speed of 4,000 r.p.m. There is a comprehensive list containing hundreds of tools and accessories in the way of rotary files, rasps, abrazive points, emery bobs, and polishing mops for use with this machine.

As will be seen in Fig. 1, the machine can be screwed to the bench or on to a transportation stand or it can be hung from above. The method of fixing will depend on what it is used for. When it is overslung it is more flexible in use, but if it is needed in the garage for a bit of car polishing, then the stand is the thing.

Equipment

The amount and type of equipment needed by the handyman will depend on his activities. What is considered the most useful kit to start with is shown in Fig. 2. These can be added to when it is found what extras are needed. With these tools, plus a little ingenuity in the form of home-made attachments, almost any small machining job can be carried out.

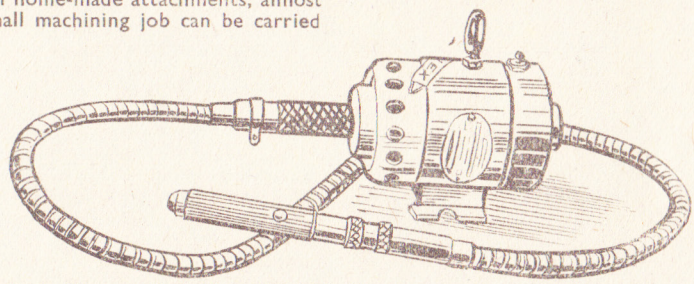


Fig. 1—The type of machine which is ideal for model maker and home mechanic

The machine is quite safe to use, providing that the usual elementary precautions are taken. Frayed and damaged lead flexes should be immediately renewed or at least taped up. The earth wire should always be connected to the machine and the plug, and although the machine is of fractional horse power, due to its high speed, the rotating cutters and files, etc., should be kept well away from long hair, loose clothes and hanging neckties.

Care and Maintenance of Machine

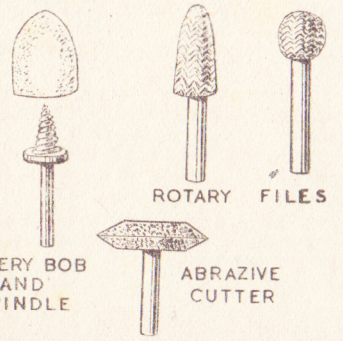
The machines are of a very robust nature and with normal use will last the home mechanic a lifetime, but like any other well designed tool, a certain amount of care and maintenance is necessary. The motor itself will require very little attention, as the bearings are packed with grease and will run indefinitely.

The flexible drive is more open to abuse and be really ill treated by non-mechanical people. Tugging at the lead while running and twisting it double, causing acute bends, should be avoided. Periodically the drive should be removed from the machine and a little oil poured down the inner cable. The drive should then be hung vertically to allow the oil to penetrate the whole length. If too much oil is used, it will only get flung out when the drive is running.

The machine is quite simple to use, and providing the precautions already mentioned are taken, no mishap will occur. When the machine has been secured by its two lugs, or hung by means of its slinging eye, plug in at the most convenient point and insert the cutter in the collet. Grip the hand-piece firmly in both hands and offer the cutter to the workpiece. The pressure applied should be such that the r.p.m. are only slightly reduced. Much more work can be done by taking light cuts at high speeds than applying too much pressure and almost stopping the machine.

Rotary cutters are most suitable for working in wood, aluminium and most forms of plastic, but for working in steel, rotary files are best. If the teeth of the cutters or files get clogged, they can be soon cleared by striking them longitudinally with the end of a piece of copper tube. If an article is to be finally polished, the choice of the primary tools is important, as deep cuts and scratches mean a lot of hard work in creating a first class finish.

Felt 'bobs' of a conical shape, coated with emery powder are most suitable for the first stages of polishing. These 'bobs' can be re-coated by first dipping them in cold water glue, then rolling



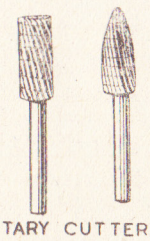


Fig. 2—A kit of tools very helpful in the home workshop

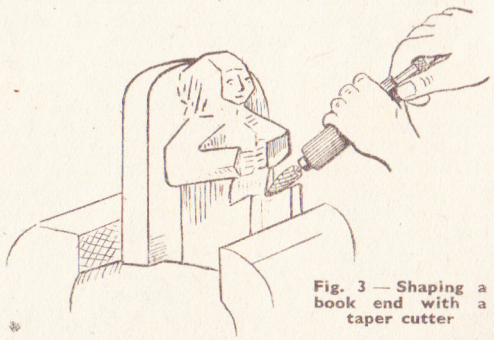


Fig. 3 — Shaping a book end with a taper cutter

(Continued foot of page 253)

Dealing with joists and heavy pendants in electric LIGHT CABLING

THE home electrician is often confronted with a job of running a length of cable under the floorboards. If the runway is in a direction parallel with the joists, the job is easily done by cutting a trap in the floorboards each end of the room, then passing a fish wire through under the boards to which the cable is attached. The cable can now easily be drawn through to the position required.

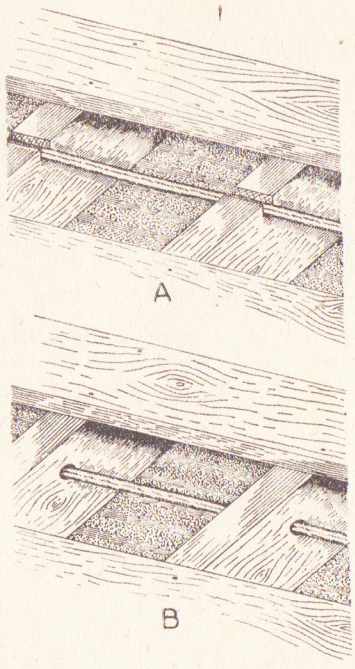


Fig. 1—How cabling runs in joists

Often, however, the cable runway is at right angles to the joists, and the job is then not quite so easy. One method of laying the cable at right angles to the joists is indicated in view (A) in Fig. 1. Here a floorboard is removed, each joist is slotted and the cable is laid in position in the slots, as clearly indicated.

If the cable is to be run in tubing, the method of slotting the joists must be adopted. If, however, the cable is lead sheathed or of the rubber insulated type, a much better method is to lay the cable as indicated in (B) Fig. 1.

Here it will be seen that holes are bored through the joists and the cable is threaded through to the required point. The holes should be bored about 2ins. from the top, and midway between the floorboard. This position will ensure that a stray nail will not be driven down into the cable. Care should be taken when laying lead sheathed cable in order not to kink it.

For Heavy Fittings

Before fixing a heavy electric light fitting, it is necessary to make quite sure that the fixing block on the ceiling is secure. Something more than just screwing the block into the laths is needed if trouble is to be avoided. Usually a trap in the floorboard above the ceiling is found, and this should be lifted and the wires leading through inspected.

If the wires run down the joist into the ceiling block which is found to be screwed up into the joist, no extra support is required. If, however, the wires pass through the ceiling midway between the joists, and the block is found to be fixed only to the laths, then extra support must be given in order to make quite secure a heavy light pendant.

Block Support

A good method of support into which the ceiling block can be screwed, is indicated in the accompanying illustrations at Fig. 2. In view (A) the wires are indicated passing through the support midway between the joists, and it will be seen the solid wooden block provides a means of screwing up the ceiling block in the room below which is to hold the heavy pendant.

Details of the block are given at (B). A suitable size is 5ins. wide by 1in. thick and just long enough, of course, to be cut a nice fit between the joists under the floorboards. A good method of fixing the block in position after drilling a hole to allow for the wires to pass through, is to screw two pieces of corner strips 1½ins. by 1½ins. on the block, as indicated in view (B).

The block is now readily fixed in position between the joists by means of screws passing through the corner pieces. The ceiling block can now be

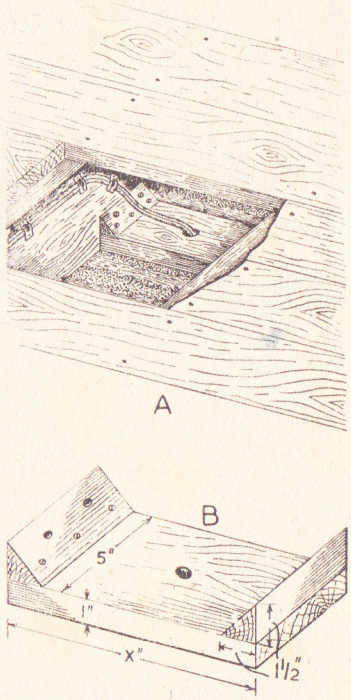


Fig. 2—Support block for heavy fittings

secured by screwing into the support from the room below. As is clearly seen, the weight of the fitting will be taken by the block supported to the joists instead of the thin laths. (320)

Driveshaft—(*Continued from page 252*)

them in emery powder of the desired grain. Final polishing is done with a linen mop or felt 'bob' on to which is rubbed buffing soap and finally chalk.

Practical Uses

The simple application of the flexible drive consists of removing, shaping and polishing metal wood and plastic. Small model boats can be hollowed out quite easily, using a suitably sized ball shaped cutter. Models of figures such as the 'three wise monkeys' can be shaped out for book ends, small vases or calendars. Images and idols to be used as ornaments can be shaped in wood, metal, or plastic, first sawing roughly to form and finishing off with various shaped cutters and files.

Small tools such as drills, taps, knives, chisels and scissors can be sharpened quite easily. To do this the drive is held in the vice (not too tight) or clamped to the bench. The tool to be sharpened is then held to an abrazive wheel fixed in the collet.

For spooning out propellers for model power boats and for giving them that 'mirror like' finish, the flexible drive is ideal. All manner of things can be polished from plastics to motor car panels, in far less time and with much less energy than it takes by hand.

When not being used for these simple applications, the machine can be fixed to drive a small saw wheel, or it can be rigged up with a countershaft and chuck and used as a drilling machine. In the absence of a lathe, the machine can be used for all kinds of small wood and plastic turning.

A complete set of chessmen can be made by first doing the necessary turning, followed by shaping with the various cutters. To the handyman and model maker the scope is unbounded and things made on a machine like this can turn out to be a very profitable sideline during the coming winter evenings. (306)

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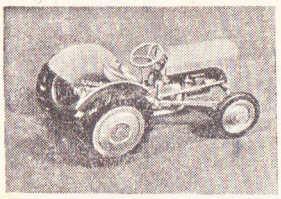

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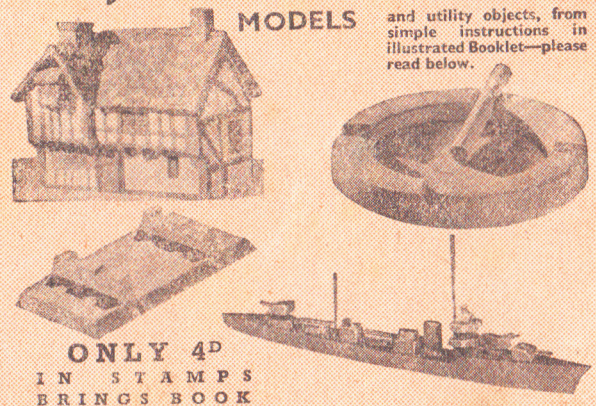

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